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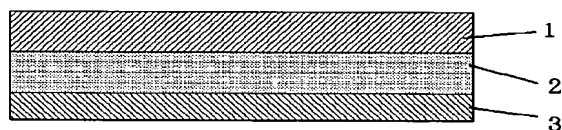
(54)【発明の名称】 半導体ウエハの保護部材

(57)【要約】

【目的】 剥離除去後の回路パターン形成面等における残留パーティクル汚染物量が少なく、かつ有機溶剤による前洗浄をすることなく直接水洗しても十分に清澄に洗浄処理でき、従って有機溶剤による前洗浄を省略できる半導体ウエハの保護部材を得ること。

【構成】 支持シート(1)に感圧接着層(2)を設けてなり、その感圧接着層がゲル分率40%以上であり、かつ水溶性ポリマーを含有する半導体ウエハの保護部材。

【効果】 半導体ウエハの保護部材に要求されるウエハ保護機能とウエハよりのスムーズな剥離除去性を満足させつつ、水溶性ポリマーの接着界面へのブリードで糊残りなく剥離除去でき、水洗効率に優れる。



【特許請求の範囲】

【請求項1】 支持シートに感圧接着層を設けてなり、その感圧接着層がゲル分率40%以上であり、かつ水溶性ポリマーを含有することを特徴とする半導体ウエハの保護部材。

【請求項2】 感圧接着層が溶液タイプの感圧接着剤にて形成され、水溶性ポリマーとして分子量5000以下のポリプロピレングリコールを含有するものである請求項1に記載の保護部材。

【発明の詳細な説明】

【0001】

【産業上の利用分野】本発明は、水による洗浄性に優れて、半導体ウエハを加工する際などに好ましく用いる半導体ウエハの保護部材に関する。

【0002】

【従来の技術】IC等の所定の回路パターンが形成された半導体ウエハには、それを可及的に薄くするための裏面研磨処理等の必要な加工が施される。ちなみに、前記の裏面研磨処理では例えば0.6mm厚程度のものが0.1~0.4mm厚などとされ、後続のダイシング工程等へと送られる。

【0003】前記した半導体ウエハの加工に際しては、例えば半導体ウエハが破損したり、回路パターン形成面が研磨屑等で汚染、損傷することを防止するために予めその回路パターン形成面に保護部材が接着され、裏面研磨等の必要な加工を施した後に剥離除去してウエハの洗浄工程などに送られる。

【0004】従来、前記の保護部材としては、水エマルジョンタイプのアクリル系感圧接着剤からなる感圧接着層を支持シートに設けたものが知られていた。しかしながら、かかる保護部材ではそれを剥離除去した後の回路パターン形成面等の洗浄処理を、アセトンやイソプロピルアルコール等の親水性有機溶剤で前洗浄したのち水洗する必要があり、有機溶剤の使用による環境衛生対策を要すると共に、洗浄効率に劣る問題点があった。

【0005】

【発明が解決しようとする課題】本発明は、剥離除去後の回路パターン形成面等における残留パーティクル汚染物量が少なく、かつ有機溶剤による前洗浄をすることなく直接水洗しても十分に清澄に洗浄処理でき、従って有機溶剤による前洗浄を省略できる半導体ウエハの保護部材を得ることを課題とする。

【0006】

【課題を解決するための手段】本発明は、支持シートに感圧接着層を設けてなり、その感圧接着層がゲル分率40%以上であり、かつ水溶性ポリマーを含有することを特徴とする半導体ウエハの保護部材を提供するものである。

【0007】

【作用】ゲル分率が40%以上の感圧接着層とすること

により、半導体ウエハに対する充分な接着力をもたせつつ、含有の水溶性ポリマーを適度に接着界面にブリードさせて感圧接着剤成分の残留（糊残り）なく剥離除去できる保護部材とすることができる。

【0008】前記の結果、裏面研磨時等における接着界面への水の浸入防止、研磨屑による回路パターン形成面等の汚染防止、剥がれによるウエハ損傷の防止等の保護機能、及び剥離時における研磨ウエハ等の割れ防止の剥離容易性も満足し、かつブリードで半導体ウエハに付着した水溶性ポリマーも水洗で容易に洗浄することができる。

【0009】

【実施例】本発明の保護部材は、支持シートに水溶性ポリマー含有の感圧接着層を有するものである。図1に本発明の保護部材を例示した。1が支持シート、2が感圧接着層である。なお3はセパレータである。

【0010】支持シートは、半導体ウエハを加工する際の衝撃緩和や、保護部材が洗浄水等で侵されて剥離が困難となることなどを防止するためのものである。従って支持シートとしては、耐水性の良好なものが好ましく用いられる。その例としては、ポリプロピレン、ポリエステル、ポリカーボネート、ポリエチレン、エチレン・酢酸ビニル共重合体、エチレン・エチルアクリレート共重合体、エチレン・プロピレン共重合体、ポリ塩化ビニルの如きプラスチックからなる厚さが10~300 $\mu$ mのシートなどがあげられる。

【0011】エチレン・酢酸ビニル共重合体、エチレン・エチルアクリレート共重合体、エチレン・プロピレン共重合体の如きゴム弾性に富むプラスチックからなる良変形性の支持シート、なかでも弾性モジュラスが1~50kg/mm<sup>2</sup>の支持シートは、粗面に対する密着性に優れて半導体ウエハの保護機能に優れる保護部材の形成に有利に用いられる。

【0012】一方、ポリプロピレン、ポリエステル、ポリカーボネートの如く腰の強い支持シートは、保護部材を自動的に半導体ウエハの回路パターン形成面に接着する場合に折れ曲がり接着（回路パターンの露出）等の接着不良を発生しにくく、自動接着装置に用いるための保護部材の形成に有利である。

【0013】感圧接着層は、保護部材を半導体ウエハの回路パターン形成面等に接着してシールするためのものである。従って感圧接着層の形成には、アクリル系感圧接着剤やゴム系感圧接着剤などの適宜な感圧接着剤を用いてよい。半導体ウエハに移着して汚染物となりやすい低分子量物質の含有を抑制した組成が好ましく、就中溶液タイプのアクリル系感圧接着剤が好ましい。特に、数平均分子量が40万以上、就中40万~300万の架橋型のアクリル系共重合体を主成分とするものが好ましい。

【0014】架橋型のアクリル系共重合体は、アクリル

酸系アルキルエステルを主体に、これと架橋性官能基を有する共重合性モノマーと、その他の必要に応じての改質モノマーとを乳化重合方式、バルク重合方式、溶液重合方式等の適宜な重合方式で調製することができる。

【0015】前記のアクリル酸系アルキルエステルとしては、例えばメチル基、エチル基、ブチル基、ペンチル基、イソブチル基、イソアミル基、ヘキシル基、2-エチルヘキシル基、イソオクチル基、イソノニル基、イソデシル基、ドデシル基の如き炭素数30以下、就中14以下のアルキル基を有するアクリル酸やメタクリル酸のエステルなどが用いられる。

【0016】架橋性官能基を有する共重合性モノマーとしては、アクリル酸、メタクリル酸、無水マレイン酸、イタコン酸の如きカルボキシル基含有モノマー、アクリル酸2-ヒドロキシエチル、メタクリル酸2-ヒドロキシエチル、アクリル酸2-ヒドロキシプロピル、メタクリル酸2-ヒドロキシプロピル、N-メチロールアクリルアミドの如きヒドロキシル基含有モノマー、アクリルアミド、メタクリルアミドの如きアミド基含有モノマー、アクリル酸グリシジル、メタクリル酸グリシジルの如きエポキシ基含有モノマー、N、N-ジメチルアミノエチルアクリレート等の如きアミノ基含有モノマーなどがあげられる。

【0017】架橋性官能基を有する共重合性モノマーは、架橋型のアクリル系共重合体を得るためや感圧接着剤の接着特性の改善などを目的として共重合される。その使用量は、アクリル酸系アルキルエステル100重量部あたり、0.1~30重量部、就中2~10重量部が一般的である。

【0018】必要に応じて用いられる改質モノマーとしては、酢酸ビニル、スチレン、N-ビニルピロリドン、アクリロニトリル、メタクリロニトリルの如きアクリル系感圧接着剤に公知のものなどがあげられる。その使用量は通常、アクリル酸系アルキルエステルと等量以下である。

【0019】ゲル分率が40%以上の感圧接着層の形成は、感圧接着剤に適宜な架橋剤を配合して架橋処理することにより形成することができる。感圧接着層のゲル分率が40%未満では凝集力不足で糊残りしやすくなる。アクリル系感圧接着剤における架橋剤としては、例えばポリイソシアネート化合物、メラミン系化合物、エポキシ系化合物、過酸化物、金属系化合物などの公知物を用いてよい。

【0020】感圧接着層には水溶性ポリマーが配合される。水溶性ポリマーとしては種々のものを用いるが、就中ポリプロピレングリコールの如く界面活性剤作用や可塑剤作用を有するものが好ましく用いられる。特にジオール型やトリオール型のポリプロピレングリコールは、感圧接着剤成分間の相溶性を高め、半導体ウエハに残留するパーティクル汚染を抑制して好ましく用い

る。ポリプロピレングリコールとしては、ブリード性や水による洗浄性などの点より分子量が5000以下、就中100~3000のものが好ましい。

【0021】水溶性ポリマー含有の感圧接着層は、例えば水溶性ポリマーを感圧接着剤に配合することにより形成することができる。その配合量は、感圧接着剤におけるアクリル系共重合体等のベースポリマー100重量部あたり、0.1~50重量部、就中1~20重量部が適当である。その配合量が、0.1重量部未満では添加効果に乏しいし、50重量部を超えると凝集力の低下で感圧接着剤成分が糊残りしやすくなり、水洗で除去しにくくなる。

【0022】保護部材の形成は例えば、支持シートに感圧接着剤を塗工してそれを加熱等により架橋処理する方式など粘着テープの形成方法に準じて行うことができる。感圧接着層の厚さは適宜に決定してよいが、一般には5~100 $\mu$ mとされる。感圧接着層の接着力は、ステンレス板(SUS304 BA)に対する接着力(常温、180度ピール値、剥離速度300mm/分)に基づき10~600g/20mm程度が好ましい。

【0023】保護部材における感圧接着層は図1に例示の如く、保管時や流通時等における汚染防止等の点から半導体ウエハに接着するまでの間、セパレータ3などにより接着保護することが好ましい。セパレータは通常、紙、プラスチックフィルム、金属箔などからなる柔軟な薄葉体で形成され、必要に応じ剥離剤で表面処理して離型性が付与される。

【0024】本発明の保護部材は、適宜な形態で半導体ウエハの回路パターン形成面などに接着することができる。予め半導体ウエハの平面形状に対応する形状に成形した場合には、半導体ウエハに接着した後の成形処理工程を省略することができる。一方、予め所定の形態とした保護部材を長尺のセパレータからなるキャリアテープに所定の間隔で接着して自動接着装置の適用が可能な形態などとすることもできる。

【0025】なお保護部材は、その接着時や剥離時等における静電気の発生やそれによる半導体ウエハの帯電で回路が破壊されることなどを防止するため帯電防止能を有することが好ましい。帯電防止能の付与は、支持シートないし感圧接着層への帯電防止剤や導電剤の添加、支持シートへの電荷移動錯体や金属膜等からなる導電層の付設など、適宜な方式で行うことができ、半導体ウエハを変質させるおそれのある不純物イオンが発生しにくい方式が好ましい。またセパレータの接着時や剥離時にも静電気が発生するので、セパレータに導電層を設けて帯電しにくくしてもよい。その導電層は適宜な方法で形成してよい。

#### 【0026】実施例1

アクリル酸ブチル80重量部とアクリロニトリル15重量部とアクリル酸5重量部を酢酸エチル中で常法により

共重合させた数平均分子量が80万のアクリル系共重合体を含有する溶液に、分子量が3000でジオール型のポリプロピレングリコール10重量部とポリイソシアネート化合物3重量部を加えたアクリル系感圧接着剤の溶液を、厚さ100 $\mu$ mのエチレン・酢酸ビニル共重合体フィルムのコロナ処理面に塗布し80℃で10分間加熱架橋して厚さ20 $\mu$ mの感圧接着層を有する保護部材を得た。

【0027】前記保護部材における感圧接着層のステンレス板 (SUS304 BA) に対する接着力 (180度ピール、剥離速度300mm/分、20℃、65% R. H.) は、120g/20mmであった。また感圧接着層のゲル分率は、70%であった。なおゲル分率は、支持シート上の感圧接着層を剥ぎ取ってトルエン (20℃) 中に24時間浸漬し、浸漬前後における重量変化より算出した。

#### 【0028】実施例2

ポリプロピレングリコールとして分子量1000のジオール型のものを用いたほかは実施例1に準じて保護部材を得た。感圧接着層のステンレス板に対する接着力は150g/20mmで、ゲル分率は68%であった。

#### 【0029】実施例3

ポリプロピレングリコールとして分子量400のジオール型のものを用いたほかは実施例1に準じて保護部材を得た。感圧接着層のステンレス板に対する接着力は165g/20mmで、ゲル分率は65%であった。

#### 【0030】比較例1

アクリル酸ブチル80重量部とアクリロニトリル15重量部とアクリル酸5重量部を酢酸エチル中で常法により共重合させた数平均分子量が80万のアクリル系共重合体を含有する溶液に、ジ옥チルフタレート10重量部とポリイソシアネート化合物3重量部を加えたアクリル系感圧接着剤の溶液を用いたほかは実施例1に準じて保

護部材を得た。感圧接着層のステンレス板に対する接着力は100g/20mmで、ゲル分率は70%であった。

#### 【0031】比較例2

ジ옥チルフタレートを配合せず、ポリイソシアネート化合物の配合量を1重量部としたアクリル系感圧接着剤の溶液を用いたほかは比較例1に準じて保護部材を得た。感圧接着層のステンレス板に対する接着力は180g/20mmで、ゲル分率は33%であった。

#### 【0032】評価試験

実施例、比較例で得た保護部材をクラス10のクリーンルーム内で、直径4インチ、厚さ0.6mmの半導体ウエハにおける回路パターン形成面に接着した後、常法により半導体ウエハを裏面研磨処理して厚さ0.25mmとし、得られた研磨ウエハより保護部材を剥離除去した。保護部材が半導体ウエハに接着していた時間は1時間である。

【0033】次に、前記の研磨ウエハを超純水中に浸漬して3分間超音波洗浄 (950kHz) した後、スピンドライヤーで乾燥させ、その保護部材接着面であった回路パターン形成面について表面構成元素数比率を測定し (パーキンエルマー社製、ESCA モデル-5400)、有機物質 (感圧接着層成分) の残留度を調べた。

【0034】他方、実施例、比較例で得た保護部材を直径4インチ、厚さ0.6mmの半導体ウエハのミラー面に接着して前記に準じ研磨ウエハを得て超音波洗浄後乾燥させ、その保護部材接着面であったミラー面について、残留する0.28 $\mu$ m以上のパーティクル汚染物の数を測定した (レーザー表面検査装置、LS-5000、日立電子エンジニアリング社製)。

【0035】前記の結果を表1に示した。

【表1】

			実施例			比較例		ブラン ク *
			1	2	3	1	2	
表面 構成	S i	洗浄前	35.0	38.3	40.4	31.8	41.7	46.2
		洗浄後	46.1	46.1	46.2	32.9	41.8	46.4
元素 数比	C	洗浄前	23.7	23.0	21.6	30.3	19.5	13.3
		洗浄後	12.9	13.0	13.0	30.0	19.5	13.0
率（ 原子 %）	O	洗浄前	41.3	38.7	38.0	37.9	38.8	40.5
		洗浄後	41.0	40.9	40.8	37.1	38.7	40.6
パーティク ル数 （個/4"）		洗浄前	10	5	20	32	689	0
		洗浄後	8	2	12	1234	707	2

【0036】表1より、本発明の保護部材によれば、水洗のみで十分に清澄な半導体ウエハが得られることがわかる。しかし、比較例1、2の保護部材では水洗のみによる汚染物の除去は困難で、殊に比較例2の保護部材にあってはパーティクル汚染物の数も多いことがわかる。

【0037】なお上記した半導体ウエハの裏面研磨処理において、実施例で得たいずれの保護部材の場合にも研磨時に水が浸入したり、研磨屑で回路パターン形成面が汚染されたり、保護部材が剥がれたりすることはなく、損傷防止等のウエハ保護機能は完全であった。また、保護部材の剥離除去に際しても研磨ウエハを割ることなく容易に剥離できた。

【0038】

【発明の効果】本発明によれば、半導体ウエハの保護部

材に要求される裏面研磨等の加工時におけるウエハの汚染防止や破損・損傷防止、剥がれ防止等の保護機能及び研磨ウエハ等を破損させないスムーズな剥離除去性を満足させつつ、剥離後の半導体ウエハ面における残留パーティクル汚染物量が少なく、有機溶剤による前洗浄をすることなく直接水洗しても十分に清澄に洗浄処理でき、従って有機溶剤による前洗浄を省略できて洗浄効率に優れた保護部材を得ることができる。

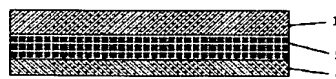
【図面の簡単な説明】

【図1】実施例の断面図。

【符号の説明】

- 1：支持シート
- 2：感圧接着層
- 3：セパレータ

【図1】



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CLAIMS

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[Claim(s)]

[Claim 1] The protection member of the semi-conductor wafer which it comes to prepare a pressure-sensitive glue line in a support sheet, and the pressure-sensitive glue line is 40% or more of gel molar fractions, and is characterized by containing a water-soluble polymer.

[Claim 2] The protection member according to claim 1 which is that in which a pressure-sensitive glue line is formed in with a solution type pressure sensitive adhesive, and contains a with a molecular weight of 5000 or less polypropylene glycol as a water-soluble polymer.

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[Translation done.]

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention is excellent in the detergency by water, and in case it processes a semi-conductor wafer, it relates to the protection member of the semi-conductor wafer which can be used preferably.

[0002]

[Description of the Prior Art] Required processing of the rear-face polish processing for making it thin as much as possible etc. is performed to the semi-conductor wafer in which predetermined circuit patterns, such as IC, were formed. Incidentally, in the aforementioned rear-face polish processing, the thing of for example, 0.6mm thickness extent is made into 0.1-0.4mm thickness etc., and is sent to a consecutive dicing process etc.

[0003] Processing of the above mentioned semi-conductor wafer is faced, and in order to damage a semi-conductor wafer, for example or to prevent that a circuit pattern formation side is polluted and damaged with polish waste etc., after a protection member's pasting the circuit pattern formation side beforehand and performing required processing of rear-face polish etc., exfoliation \*\*\* is carried out and it is sent to the washing process of a wafer etc.

[0004] What prepared conventionally the pressure-sensitive glue line which consists of an acrylic water emulsion type pressure sensitive adhesive in the support sheet as the aforementioned protection member was known. However, while it needed to be rinsed after hydrophilic organic solvents, such as an acetone and isopropyl alcohol, washed washing processing of the circuit pattern formation side after carrying out exfoliation \*\*\* of it etc. the front, and this protection member took the cure against environmental sanitation by the activity of an organic solvent, there was a trouble of being inferior to washing effectiveness.

[0005]

[Problem(s) to be Solved by the Invention] This invention has few amounts of residual particle contaminations in the circuit pattern formation side after exfoliation \*\*\* etc., and even if it rinses directly, without carrying out washing before being based on an organic solvent, before fully being able to carry out washing processing at founding, therefore being based on an organic solvent, it makes it a technical problem to obtain the protection member of the semi-conductor wafer which can omit washing.

[0006]

[Means for Solving the Problem] This invention comes to prepare a pressure-sensitive glue line in a support sheet, and offers the protection member of the semi-conductor wafer which the pressure-sensitive glue line is 40% or more of gel molar fractions, and is characterized by containing a water-soluble polymer.

[0007]

[Function] It can consider as the protection member which is made to carry out bleeding of the water-soluble polymer of content to an adhesion interface moderately, and can carry out exfoliation \*\*\* of it without the residual (paste remainder) of a pressure sensitive adhesive component, giving sufficient adhesive strength to a semi-conductor wafer, when a gel molar fraction considers as 40% or more of pressure-sensitive glue line.

[0008] The water-soluble polymer which also satisfied the exfoliation ease of crack prevention, such as protection features, such as pollution controls, such as a circuit pattern formation side by encroachment prevention of the water to the adhesion interface in the time of rear-face polish etc. and polish waste, and prevention of the wafer breakage by peeling, and a polish wafer at the time of exfoliation, and adhered to the semi-conductor wafer with bleeding can also be easily washed by rinsing the aforementioned result.

[0009]

[Example] The protection member of this invention has the pressure-sensitive glue line of water-soluble polymer content in a support sheet. The protection member of this invention was illustrated to drawing 1. 1 is a support sheet and 2 is a pressure-sensitive glue line. In addition, 3 is a separator.

[0010] A support sheet is for preventing the impact relaxation at the time of processing a semi-conductor wafer, that a protection member is invaded with wash water etc. and exfoliation becomes difficult, etc. Therefore, as a support sheet, a waterproof good thing is used preferably. As the example, polypropylene, polyester, a polycarbonate, polyethylene, an ethylene-vinylacetate copolymer, an ethylene ethyl acrylate copolymer, ethylene propylene rubber, the sheet whose thickness it is thin from the plastics like a polyvinyl chloride is 10-300 micrometers are raised.

[0011] An elastic modulus can use the support sheet of 2 mm also in the support sheet of right deformans which consists of plastics which is rich in the rubber elasticity like an ethylene-vinylacetate copolymer, an ethylene ethyl

acrylate copolymer, and ethylene propylene rubber in favor of formation of the protection member which is excellent in adhesion [ as opposed to a split face 1-50kg /], and is excellent in the protection feature of a semi-conductor wafer.

[0012] It is advantageous to formation of the protection member for polypropylene, polyester, and the support sheet with the waist strong like a polycarbonate bending, when pasting up a protection member on the circuit pattern formation side of a semi-conductor wafer automatically, and they being unable to generate adhesive agents, such as adhesion (exposure of a circuit pattern), easily, and on the other hand, using for automatic adhesion equipment.

[0013] A pressure-sensitive glue line is for pasting up and carrying out the seal of the protection member to the circuit pattern formation side of a semi-conductor wafer etc. Therefore, a pressure sensitive adhesive with proper acrylic pressure sensitive adhesive, rubber system pressure sensitive adhesive, etc. may be used for formation of a pressure-sensitive glue line. The presentation which controlled content of the low-molecular-weight matter which carries out transfer to a semi-conductor wafer, and is easy to serve as a contamination is desirable, and an acrylic solution type pressure sensitive adhesive is desirable above all. That to which number average molecular weight uses the acrylic copolymer of the bridge formation mold of 400,000-3 million as a principal component above all 400,000 or more especially is desirable.

[0014] The acrylic copolymer of a bridge formation mold can prepare the copolymerization nature monomer which has this and a cross-linking functional group for acrylic-acid system alkyl ester to a subject, and a refining monomer as occasion demands [ for other ] by the polymerization method with proper emulsion-polymerization method, bulk polymerization method, solution polymerization method, etc.

[0015] As the aforementioned acrylic-acid system alkyl ester, the ester of the acrylic acid which has 14 or less alkyl group above all, or a methacrylic acid etc. is used 30 or less carbon number like a methyl group, an ethyl group, a pull pill radical, butyl, an isobutyl radical, an isoamyl radical, a hexyl group, a 2-ethylhexyl radical, an iso octyl radical, an iso nonyl radical, an isodecyl radical, and the dodecyl, for example.

[0016] As a copolymerization nature monomer which has a cross-linking functional group The carboxyl group content monomer like an acrylic acid, a methacrylic acid, a maleic anhydride, and an itaconic acid, Acrylic-acid 2-hydroxyethyl, methacrylic-acid 2-hydroxyethyl, 2-hydroxypropyl acrylate, 2-hydroxypropyl methacrylate, The hydroxyl content monomer like N-methylol acrylamide, The amino-group content monomer like epoxy group content monomer [ like the amide group content monomer like acrylamide and methacrylamide metaglycidyl acrylate, and glycidyl methacrylate ], N, and N-dimethylamino ethyl acrylate etc. is raised.

[0017] In order to obtain the acrylic copolymer of a bridge formation mold, copolymerization of the copolymerization nature monomer which has a cross-linking functional group is carried out for the purpose of an improvement of the adhesion property of a pressure sensitive adhesive etc. the amount used — per acrylic-acid system alkyl ester 100 weight section and 0.1 - 30 weight section — 2 - 10 weight section is common above all.

[0018] As a refining monomer used if needed, a well-known thing etc. is raised to the acrylic pressure sensitive adhesive like vinyl acetate, styrene, N-vinyl pyrrolidone, acrylonitrile, and a methacrylonitrile. The amount used is usually acrylic-acid system alkyl ester and below equivalent weight.

[0019] A gel molar fraction can form formation of 40% or more of pressure-sensitive glue line by blending a proper cross linking agent with a pressure sensitive adhesive, and carrying out bridge formation processing. At less than 40%, the cohesive force of the gel molar fraction of a pressure-sensitive glue line is insufficient, and it becomes easy to carry out the paste remainder. As a cross linking agent in an acrylic pressure sensitive adhesive, well-known objects, such as the poly isocyanate compound, a melamine system compound, an epoxy system compound, a peroxide, and a metal system compound, may be used, for example.

[0020] A water-soluble polymer is blended with a pressure-sensitive glue line. Although various things can be used as a water-soluble polymer, what has a surfactant operation and a plasticizer operation like a polypropylene glycol above all is used preferably. Especially the polypropylene glycol of a diol mold or a triol mold raises the compatibility between pressure sensitive adhesive components, controls the particle contamination which remains to a semi-conductor wafer, and it can be preferably used for it. As a polypropylene glycol, the thing of 100-3000 has [ 5000 or less ] molecular weight more desirable than points, such as bleeding nature and detergency by water, above all.

[0021] The pressure-sensitive glue line of water-soluble polymer content can be formed by blending for example, a water-soluble polymer with a pressure sensitive adhesive. per base polymer 100 weight sections, such as an acrylic copolymer [ in / in the loadings / a pressure sensitive adhesive ], and 0.1 - 50 weight section — 1 - 20 weight section is suitable above all. If the loadings are deficient in the addition effectiveness in under the 0.1 weight sections and exceed 50 weight sections, it will become easy to carry out the paste remainder of the pressure sensitive adhesive component by lowering of cohesive force, and will be hard coming to remove by rinsing.

[0022] Formation of a protection member can carry out coating of the pressure sensitive adhesive to a support sheet, and can perform it according to the formation approaches of adhesive tape, such as a method which carries out bridge formation processing with heating etc. Although the thickness of a pressure-sensitive glue line may be determined suitably, generally it may be 5-100 micrometers. The adhesive strength of a pressure-sensitive glue line has desirable 10-600g / about 20mm based on the adhesive strength (a part for 300mm/in ordinary temperature, a 180-degree Peel value, and exfoliation rate) to a stainless plate (SUS304 BA).

[0023] As for the pressure-sensitive glue line in a protection member, it is desirable to carry out adhesion protection with a separator 3 etc. until it pastes a semi-conductor wafer from points, such as a pollution control in the time of storage and a negotiation etc., like instantiation at drawing 1 . A separator is usually formed with the flexible Japanese tissue object which consists of paper, a plastic film, a metallic foil, etc., surface treatment is



carried out by the remover if needed, and a mold-release characteristic is given.

[0024] The protection member of this invention can be pasted up on the circuit pattern formation side of a semi-conductor wafer etc. with a proper gestalt. When it fabricates in the configuration corresponding to the flat-surface configuration of a semi-conductor wafer beforehand, shaping down stream processing after pasting a semi-conductor wafer can be skipped. The protection member made into the predetermined gestalt on the other hand beforehand can be pasted up on the carrier tape which consists of a long separator at the predetermined spacing, and it can also consider as the gestalt which can apply automatic adhesion equipment.

[0025] In addition, as for a protection member, it is desirable to have antistatic ability in order to prevent that a circuit is destroyed by generating of static electricity in the time of the adhesion and exfoliation etc., or electrification of the semi-conductor wafer by it etc. Grant of antistatic ability has the desirable method which impurity ion with a possibility of proper methods which consist of addition of the antistatic agent to a support sheet thru/or a pressure-sensitive glue line or an electric conduction agent, an electron donor acceptor complex, a metal membrane to a support sheet, etc., such as an attachment of a conductive layer, being able to perform, and deteriorating a semi-conductor wafer cannot generate easily. Moreover, since static electricity occurs also at the time of adhesion of a separator, and exfoliation, you may make it hard to prepare a conductive layer in a separator and to be charged. The conductive layer may be formed by the proper approach.

[0026] In the solution with which the number average molecular weight to which copolymerization of the example 1 butyl-acrylate 80 weight section, the acrylonitrile 15 weight section, and the acrylic-acid 5 weight section was carried out with the conventional method in ethyl acetate contains the acrylic copolymer of 800,000 Molecular weight the solution of the acrylic pressure sensitive adhesive which added the polypropylene-glycol 10 weight section of a diol mold, and the poly isocyanate compound 3 weight section by 3000 The protection member which applies to the corona treatment side of an ethylene and a vinyl acetate copolymer film with a thickness of 100 micrometers, carries out heating bridge formation for 10 minutes at 80 degrees C, and has a pressure-sensitive glue line with a thickness of 20 micrometers was obtained.

[0027] The adhesive strength (part 20 degrees C for 300mm/in 180-degree Peel and exfoliation rate, 65%R.H.) to the stainless plate (SUS304 BA) of the pressure-sensitive glue line in said protection member was 120g / 20mm. Moreover, the gel molar fraction of a pressure-sensitive glue line was 70%. In addition, the gel molar fraction stripped off the pressure-sensitive glue line on a support sheet, was immersed into toluene (20 degrees C) for 24 hours, and was computed from the weight change before and behind immersion.

[0028] The thing of the diol mold of molecular weight 1000 was used as example 2 polypropylene glycol, and also the protection member was obtained according to the example 1. The adhesive strength to the stainless plate of a pressure-sensitive glue line was 150g / 20mm, and the gel molar fraction was 68%.

[0029] The thing of the diol mold of molecular weight 400 was used as example 3 polypropylene glycol, and also the protection member was obtained according to the example 1. The adhesive strength to the stainless plate of a pressure-sensitive glue line was 165g / 20mm, and the gel molar fraction was 65%.

[0030] The solution of the acrylic pressure sensitive adhesive which added the dioctyl phthalate 10 weight section and the poly isocyanate compound 3 weight section to the solution with which the number average molecular weight to which copolymerization of the example of comparison 1 butyl-acrylate 80 weight section, the acrylonitrile 15 weight section, and the acrylic-acid 5 weight section was carried out with the conventional method in ethyl acetate contains the acrylic copolymer of 800,000 was used, and also the protection member was obtained according to the example 1. The adhesive strength to the stainless plate of a pressure-sensitive glue line was 100g / 20mm, and the gel molar fraction was 70%.

[0031] The solution of the acrylic pressure sensitive adhesive which made the loadings of the poly isocyanate compound 1 weight section was used, and also example of comparison 2 dioctyl phthalate was not blended, but the protection member was obtained according to the example 1 of a comparison. The adhesive strength to the stainless plate of a pressure-sensitive glue line was 180g / 20mm, and the gel molar fraction was 33%.

[0032] After pasting up the protection member obtained in the assessment trial example and the example of a comparison in the clean room of a class 10 on the circuit pattern formation side in a semi-conductor wafer with a diameter [ of 4 inches ], and a thickness of 0.6mm, rear-face polish processing of the semi-conductor wafer was carried out with the conventional method, it carried out to 0.25mm in thickness, and exfoliation \*\*\*\* of the protection member was carried out from the obtained polish wafer. The time amount which the protection member had pasted up on the semi-conductor wafer is 1 hour.

[0033] Next, after being immersed into ultrapure water and carrying out ultrasonic cleaning (950kHz) of the aforementioned polish wafer for 3 minutes, it be made to dry with a spin dryer, the number ratio of surface configuration elements be measured about the circuit pattern formation side which be the protection member adhesion side (the PerkinElmer, Inc. make, ESCA model -5400), and whenever [ residual / of an organic substance (pressure-sensitive glue line component) ] be investigated.

[0034] On the other hand, pasted up the protection member obtained in the example and the example of a comparison on the mirror side of a semi-conductor wafer with a diameter [ of 4 inches ], and a thickness of 0.6mm, obtained the polish wafer according to the above, it was made to dry after ultrasonic cleaning, and the number of the particle contaminations 0.28 micrometers or more which remain was measured about the mirror side which was the protection member adhesion side (laser surface-analysis equipment, LS-5000, Hitachi Electronics Engineering make).

[0035] The aforementioned result was shown in a table 1.

[A table 1]

			実 施 例			比 較 例		ブ ラ ン ク ＊
			1	2	3	1	2	
表面 構成	S 1	洗浄前	35.0	38.3	40.4	31.8	41.7	46.2
		洗浄後	46.1	46.1	46.2	32.9	41.8	46.4
元素 数比	C	洗浄前	23.7	23.0	21.6	30.3	19.5	13.3
		洗浄後	12.9	13.0	13.0	30.0	19.5	13.0
率（ 原子 ％）	O	洗浄前	41.3	38.7	38.0	37.9	38.8	40.5
		洗浄後	41.0	40.9	40.8	37.1	38.7	40.6
パーティク ル数 （個／4"）		洗浄前	1 0	5	2 0	3 2	689	0
		洗浄後	8	2	1 2	1234	707	2

\*ブランク：初期状態の半導体ウエハ

[0036] According to the protection member of this invention, a table 1 shows that a semi-conductor wafer clear enough is obtained only by rinsing. However, in the protection member of the examples 1 and 2 of a comparison, if clearance of the contamination only by rinsing is difficult and is in the protection member of the example 2 of a comparison especially, it is understood that there are many particle contaminations.

[0037] In addition, in rear-face polish processing of the above-mentioned semi-conductor wafer, in the case of [neither of] the protection members obtained in the example, water permeated at the time of polish, a circuit pattern formation side was not polluted with polish waste, or a protection member did not separate, and wafer protection features, such as breakage prevention, were perfect. Moreover, it has exfoliated easily, without breaking a polish wafer, even if it faced exfoliation \*\*\*\* of a protection member.

[0038]

[Effect of the Invention] Satisfying smooth exfoliation \*\*\*\*\* which does not damage a protection feature, polish wafers, etc., such as a pollution control of the wafer at the time of processing of the rear-face polish required of the protection member of a semi-conductor wafer, and breakage / breakage prevention, peeling prevention, according to this invention There are few amounts of residual particle contaminations in the semi-conductor wafer side after exfoliation, and even if it rinses directly, without carrying out washing before being based on an organic solvent, before fully being able to carry out washing processing at founding, therefore being based on an organic solvent, the protection member which can omit washing and is excellent in washing effectiveness can be obtained.

[Translation done.]

## PATENT ABSTRACTS OF JAPAN

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## (54) PROTECTIVE MEMBER FOR SEMICONDUCTOR WAFER

## (57)Abstract:

PURPOSE: To provide a protective member for a semiconductor wafer wherein the amount of remaining particle contamination on a circuit pattern formation surface after exfoliation and removal is reduced, and a sufficiently clear cleaning processing is ensured with direct washing without performing precleaning with an organic solvent and hence the need of the precleaning with an organic solvent is eliminated.

CONSTITUTION: A pressure sensitive adhesive layer 2 is provided on a support sheet 1, which layer has 40% or more of a gel distribution rate and which layer contains aqueous polymer.

Accordingly, a wafer protective function required for a protective member for a semiconductor wafer as well as smooth exfoliation and removal properties from the wafer are satisfied, while simultaneously the protective member is exfoliated and removed without leaving any glue by bleeding of the aqueous polymer to a bonded interface, for excellent washing efficiency.



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